MICHIGAN ENVIRONMENTAL SCIENCE BOARD
MERCURY PANEL

MEETING SUMMARY
FRIDAY, OCTOBER 16, 1992
ROOM A271, PLANT AND SOIL SCIENCE BUILDING
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN

BOARD MEMBERS PRESENT:

Dr. Lawrence Fischer, Chair
Dr. Johnathan Bulkley
Dr. Richard Cook
Dr. Raymond Demers
Dr. Ronald Olsen
Dr. Bette Premo
Dr. Eileen van Ravenswaay
Dr. George Wolff

BOARD MEMBERS ABSENT:

Dr. David Long

BOARD STAFF PRESENT:

Mr. Keith Harrison, Executive Director
Ms. Sharon Picard, Financial Officer
Ms. Shirley Willis, Administrative Officer

I. CALL TO ORDER

Dr. Lawrence Fischer, Chair, called the meeting of the Michigan Environmental Science Board Mercury Panel to order at 1:15 p.m.

II. EXECUTIVE DIRECTOR'S REPORT

Mr. Harrison briefly discussed the material which had been sent to the Panel members since September 11, 1992. He reminded the Panel members of the necessity to submit their expense reimbursement forms as soon as possible after the meeting. Finally, Mr. Harrison informed the Panel that due to the unique Board/Panel meeting format, the generally accepted method of approving meeting minutes would need to be changed. Instead, draft meeting minutes would be sent to each Board member with a request for concurrence or nonconcurrence. Members who do not concur with the draft minutes

will need to indicate the area or areas within the minutes where the change is needed. Draft minutes with the requested changes incorporated will then be resubmitted to the members for concurrence or nonconcurrence. Suggested editorial changes may be made, but will not result in the need for resubmittal of the draft minutes to the members for review.

III. PUBLIC COMMENT

Dennis Leonard, Detroit Edison, indicated that in addition to the material which he had previously provided the Panel, he wanted to extend an open invitation to the Panel to bring in some of the utility industries' researchers from the Electric Power Research Institute to present various mercury-related research topics.

Dr. Wolff expressed his concern about the need to obtain data which shows the speciation of mercury into particulates and gas. Also, he stated that there currently was a need to obtain mercury data from within plumes
versus in-stack measurements.

Mr. Leonard stated that there were on-going studies on this issue. He indicated that a fair amount of mercury that is emitted from coal-fired plants was in the form of mercury oxide, which is not stable. Whether it reverts back to the gaseous mercury form or it combines with sulfates and becomes a mercury sulfate precipitate was unknown. The utility industry was planning on looking into this issue further.

Mr. Jeff Hahn, Ogden-Martin Systems and Integrated Waste Services Association, presented concerns regarding several statements contained in the DNR draft mercury report. First, the report states inaccurately that the waste combustion industry is the single largest source of mercury. The Franklin report from the USEPA documents a reduction of mercury in solid waste. The DNR investigation also ignores the USEPA Clean Air Act Amendments of 1990 and the mandate under Section 129 to remove mercury from existing and future waste combustion sources. Mr. Hahn stated that he would provide the Panel with the USEPA test results from the Stanisloff plant documenting an 80 percent removal of mercury by the use of activated carbon. Mr. Hahn stressed that it doesn't matter where the carbon is put into the system, so long as it goes in before the particulate collection device. Regarding the question on mercury speciation, Mr. Hahn indicated that based on his review of Dr. Nicholas Bloom's work at the Electric Power Research Institute (EPRI), there is no particulate-bound mercury. It is either the elemental form as a vapor or mercuric chloride. The raw data from these tests will be sent to the Panel.

Dr. Wolff asked if the measurements were stack or plume measurements. Mr. Hahn indicated that they were stack measurements.

Dr. Wolff asked if the oxidized mercury in the gas phase in the stack would go to a particulate state once it left the stack. Mr. Hahn indicated that the answer was unknown.

Mr. Hahn presented two other concerns about the DNR draft mercury report. First, the DNR reported inaccurately that the Kent County Ogden-Martin facility emitted 300 to 1,000 ppm HCl. Mr. Hahn indicated that he would send the Panel DNR source test data which would demonstrate much lower values for HCl. Second, Mr. Hahn stated that the report left out many other sources of mercury in the discussion. Such sources as liquid fuels, natural gas and sewage sludge were not addressed.

Dr. Olsen asked what becomes of the carbon used to trap the mercury. Mr. Hahn answered that it would go into the combined ash which would go to a landfill for disposal.

Dr. Olsen asked if the USEPA regulates the facilities under Best Available Technology. Dr. Hahn stated that new facilities are regulated under Maximum Achievable Technology.

Dr. Kay Jones, Zephyr Consulting and Greater Detroit Resources Recovery Authority, presented a review of the DNR draft mercury report. According to Dr. Jones, and based on data from the EPRI-sponsored conference in Monterey, the DNR report is about two years out of date from the state-of-art information. One source of mercury lacking discussion in the report is dental amalgam. There are data which suggest that people with an average amount of dental amalgam in their mouths are probably receiving two-thirds of their mercury exposure. Sweden has announced that it will prohibit the use of mercury in dental amalgam for children after 1993; followed with a total prohibition after 1995.

Dr. Jones stated that in terms of mercury deposition, practically all the mercury which is deposited will be deposited during rainfall events. Most impacts on lakes will result from direct deposition in the lakes or the wetlands surrounding them. In terms of fish bio-uptake, the most important parameter to know is the concentration of dissolved methyl mercury in the water. The bioconcentration factor of this is high.

Dr. Olsen asked if the Monterey Conference papers were peer-reviewed. Dr. Jones answered that the abstracts were peer-reviewed.

IV. DISCUSSION OF FINDINGS TO DATE

Mercury Consumption, Sources and Emissions (Chapter 3)

Dr. Long's written comments were passed out to the Panel members (Attachment 1).

Dr. Olsen indicated that the DNR draft mercury report tends to focus on gross mercury emissions and ignores mercury emissions as a function of biological activity near the surface of the soil. He indicated that it is almost impossible to isolate an organism from the first 2 or 3 centimeters of the soil that is not mercury-resistant by a well-defined live chemical mechanism, leading to the production of mercury zero. As a result of the land

tilling practices and the amount of land which has been tilled since the 1800s, a lot of bacteria have been exposed to atmospheric oxygen. Consequently, a lot of metabolism and a release of mercury to the atmosphere have taken place. Little information on this topic exists within the literature. It may be that this is, if not a dominant, a very important component of the total emission of mercury; a component about which nothing can be done.

Known point and non-point mercury emission sources need to be evaluated against a background of natural biological activity. Natural microbic processes that contribute to soil fertility in any but the most arid regions of this planet may, in fact, be increasing in their emissions of mercury because of land tilling, or have increased over the last century prior to the time in which the base line was used to establish what has happened since.

Dr. Olsen further stated that it is not at all certain that the apparent increase in mercury is the result of urbanization and industrialization. When all the known sources of mercury emissions are totaled, it's easy to get the impression that the largest proportion of that may result from industrial activity, and until we know what the ambient mercury load is of this planet, we cannot really evaluate the cycling of anthropogenic emissions. As one example, 2-4-D is a generally approved herbicide because it is biodegradable. A lot of time has been devoted to researching bacteria that biodegrade 2-4-D.

These bacteria are found everywhere including areas where there has never been any 2-4-D. Every single one of these bacteria also has a biochemical mechanism for the volatization of mercury. So mercury has been with us for a long time on the planet and when you look for a non-selected marker like 2-4-D degradation, mercury shows up. This situation represents a background that needs to be subtracted to identify the real causes for concern. The causes in the DNR report may only represent a small portion of the total. They do not represent the whole problem as represented in the document.

Dr. Premo asked if Dr. Olsen thought that anthropogenic sources of mercury to the soils have been enhanced as a result of increased biomethylation by soil organisms? Dr. Olsen indicated that it is difficult to determine because if you go down in the caves in Mexico that have been sealed up for four thousand years and drag out the bacterial spores and grow them, they will all be mercury resistant.

Dr. Olsen stated that another criticism that he had with the report was that in Kalamazoo water derived from private wells contains a fair amount of mercury. The manufacturing operations are being judged in the report on what comes out the spout with no allowance for what goes in.

Dr. Wolff commented that the DNR report states that the natural sources of mercury in Michigan are 12 tons a year but that figure may be off by a factor of ten. In looking at the listed anthropogenic sources, there are sources that are not mentioned that should be. There are sources that we have better information on and could have been

characterized better. But probably, it's not going to change in order of magnitude. It is still going to be somewhere between 37,000 - 100,000 pounds per year.

Dr. Fischer expressed concern about the estimate used within the report for latex paint constituting one-third of the total anthropogenic sources of mercury. Dr. Wolff agreed and stated that it is probably o.k. as a ball park figure.

Dr. Premo indicated that in the case of latex paint, the mercury component has been banned by the USEPA anyway, so that is a source that is going to be phased out. It seemed to her that the major reason why you want to know what the sources are is that ultimately, if you want to do anything about this problem, you want to know which sources you are going to have to restrict.

Dr. Wolff stated that based on a calculation he performed for Michigan, if you took all the emissions that are accounted for in the report, they would only account for 8 percent of the observed ambient air levels.

Dr. Cook indicated that the mercury emissions issue is subject to interpretation because of the wide variations shown in the reports that he saw from the incinerator people. For example, the State of New Jersey estimates that approximately 50 percent of the mercury emissions come from municipal waste incineration. The incineration industry estimates that it is less than 1 percent. The same sort of thing is true of the utility industry, where they tend to minimize their contribution. What is happening is that people are selecting those ends of the ranges that they choose to select. These variations are tremendously wide. We can try to zero in on it as best we can, but there is no way, no matter how many hours we spend in these papers, that we are going to zero in on some number that we are all going to agree with.

Dr. Wolff stated that one of the problems with the emissions factors is that people tend to get an emission factor from a particular source and apply it to all sources of that generic type. But, both the concentration as well as the form of mercury is going to depend upon what type of control system is in place and these will vary considerably. You almost have to have plume data from every major source in order to characterize it with any degree of reliability. Unfortunately, these data are not readily available. In addition, what data are available are inadequate since they are based only on in-stack measurements.

Dr. Hahn stated that we do know that the mercury that is coming out of the stacks is in a non-particulate form, and there are data, although not plume data, that relates ambient concentrations to washout levels of mercury in Europe. Given this, and based on experience in New Jersey, we do have a pretty good handle on what we can expect from rain out of mercury if we know the ambient concentrations.

Dr. Wolff indicated that the biggest unknowns were the forms of the mercury emitted. There is some evidence that oxidized gaseous mercury exists in hot stack effluents, but

this could rapidly condense to particulate mercury once it cools down. If this is the case, then its fate is entirely different than if it was a gas.

According to Dr. Wolff, most of the information up to now has been focused on the remote areas or the rural areas where the mercury accumulation in fish has been noticed. Dr. Keeler, in Ann Arbor, made measurements in remote, rural areas of Michigan, and found levels similar to what other people have found. But, when he also took measurements in Chicago, Ann Arbor and two sites in Detroit, all the generalizations that were previously made from rural data were brought into question. For example, it was a rule of thumb that gaseous elemental mercury concentrations were about 1 to 4 ng/m^3 and that represented about 95 percent of the airborne mercury; most of the rest was thought to be particulate mercury (approximately 10 - 20 pg/m^3 range). The average gaseous mercury in the Keeler study in Detroit was 8.5 ng/m^3 (8.5 as opposed to the background of 2) in a 24-hour sample. The highest concentration was 70 ng/m^3 . For particulate mercury, Dr. Keeler measured an average of 342 pg/m^3 at one site in Detroit, and an average of 297 pg/m^3 at the other one. He also measured an average of 100 pg/m^3 in Ann Arbor, and average of 97 pg/m^3 in Chicago, so the particulates were much more elevated. The maximum concentrations of particulate in Chicago were 518 pg/m^3, and in Detroit were 1,230 pg/m^3. Dr. Keeler used a technique called, receptor modeling, where the ratios of elements are looked at to try to ascribe the sources based on the elemental profile for the various sources. The preliminary results indicated that he could not separate out an incinerator or coal burning source. The only thing he did see, was a signature that looks like coke, or something associated with iron and steel. Dr. Wolff summarized that we know very little about the sources of mercury and the urban concentration patterns of mercury.

Dr. Hahn indicated that it was his understanding and feeling that mercuric chloride would be in a vapor form in the stack and would most likely not attach to any of the solid particulates in the stack because it would be too small a quantity for them to meet. In the atmosphere, and depending on the urban particulate that existed over a metropolitan area, the mercury would condense from the mercuric chloride or the oxidized elemental mercury and come down as particulate mercury. Deposition would occur in the far field from a point source rather than from the near field. This is the area in which no one knows just what happens in that transformation from vapor to oxidation and then absorption and fallout.

Dr. Wolff stated that even if the transformation is relatively fast, it is going to form a fine particle; a particle that is eventually on the order of one half a micron. The life-time of a particle one half a micron in the atmosphere is on the average of 7 days. The only important sink for a particle this size is nucleation scavenging, not rain scavenging. It has to get in the cloud and that is the principal removal mechanism. So even if it is a fine particle, it is going to travel. It is not going to preferentially deposit out in the near field.

Dr. Fischer indicated that there is pending legislation in Michigan which wants to limit the siting of incinerators within so many miles of lakes. Given what Dr. Wolff said, that it

would appear that the proposed legislation to prevent incinerators from being sited near lakes is not really a concern. It is going to travel more than a few miles and the loading increment would be small.

Dr. Wolff stated that he had also reviewed the paper by Miss Taylor that was attached to the legislative proposal received at the last meeting that tried to somehow proportion up the impacts on the lakes. All of the calculations that were made in the paper were overly simplified and did not conform with the known science.

Dr. Fischer questioned whether the list in Chapter 3, page 23,of the DNR report was a complete listing of industries with effluent limits in Michigan, and whether the list was used to estimate mercury input. He questioned whether it was a valid and useful list, and if the input of mercury might not be underestimated.

Robert Sills, DNR, responded that the facilities on the list were the only ones for which the DNR had actual data on detectable mercury in the discharge.

Environmental Fate and Transport (Chapter 4)

Dr. Olsen commented on the mercury cycle described in the DNR report. The directions of biocycling activities are described, but cannot necessarily be quantified. While he did not think bacteria were making much methyl mercury, the report did correctly identify microbial activities as a significant participant in atmospheric ambience. If atmospheric ambience is a large quantity then background contamination is important.

Dr. Premo reported her discussion with Dr. Carl Watra, whose current research is in mercury biocycling. The research suggests that concentrations of photosynthetic sulfur bacteria may be creating methyl mercury as they oxidize reduced sulfur and contribute methyl mercury in sediments.

Dr. Olsen stated that in view of the redox potential, inspection of a periodic table might tell Dr. Watra more about the chemistry and bias toward one form or another and the activity of one ion or another. Microbial activity in the sediments is anaerobic, characterized by low redox potential. The bacteria he cites are not oxygen tolerant. In any case, if they are making methyl mercury, as soon as it gets into the water, the bacteria there will take care of it. It will become elemental mercury.

Dr. Jones commented that there have been a number of computer models built recently on the fate of mercury in water, and that these suggest that a lot of mercury conversion in water is abiotic.

Dr. Olsen commented that such models may have limited utility, since they are sometimes based on unidentified assumption and cannot duplicate field conditions.

Mr. Leonard indicated that there are currently attempts to validate the models by trying them out on different watersheds to see whether they make accurate predictions, and that there is some basic research being done to determine whether the bacteria are really doing what they are thought to be doing.

Dr. Fischer indicated the entire cycle of mercury from the atmosphere into the aquatic system then into the fish is not well-known and there are major inconsistencies in the extant theories.

Dr. Olsen brought up the role of runoff in lakes in Michigan and Minnesota and the fact that the issue as it relates to mercury deposition was not discussed in the report.

Dr. Premo said that the report concludes that all the mercury comes into the lakes from the atmosphere, but that doesn't seem to be supported at this time, except by the research showing that the sediments laid down more recently have higher levels of mercury than older sediments, but that that didn't seem sufficient evidence.

Dr. Fischer noted that Dr. Long's paper states that he thinks that atmospheric input is significant simply because of the uniformity in mercury levels among lake sediments and in water column levels. Where there are known point sources, increasing levels of mercury can be identified. The general uniformity indicates that a good share is coming from the atmosphere.

Dr. Premo commented that they have to look at snow melt, which is also a component of the atmospheric portion. Given the data from the Upper Peninsula, it has been considered that snow melt that is particularly acidified may pick up mercury along the land as it travels to the water.

Dr. van Ravenswaay asked about the role of acid rain. Dr. Premo responded that it may play a role, and that if acid rain is indeed acidifying lakes, it may have some effect on the speciation of mercury. It could also dissolve naturally occurring mercury as it runs over land and transport it to lakes.

<u>Levels of Mercury Contamination (Chapter 5)</u>

Dr. Premo stated that measurement techniques have been inadequate in the past, so the data, in Chapter 5 can be discounted. She described new collection and measurement techniques being used in Wisconsin that allow measurements more free from contamination and at much lower levels. She suggested that the techniques be used in Michigan to develop a more accurate database. As a consequence of these techniques, she indicated that they will find that virtually every water surface discharger and probably even rainwater in the state will exceed the current water quality standard. Such data could be useful to help raise the water quality standard in Michigan.

Dr. Fischer stated that it would be easier to monitor something else than consider these relative low concentrations in air and water.

Dr. Premo noted that perhaps fish could be used as indicators of water quality. But there is no evidence to allow anyone to say that at a certain level of water contamination, fish will contain a certain amount of mercury.

Dr. Premo further pointed out that the Wisconsin DNR is currently setting NPDES discharge limits based on fish tissue levels in receiving waters, but she was uncertain as to what criteria they were using. Some other papers she has read seemed to suggest some correlation with pH and alkalinity of lakes, which may explain why more lakes in the Upper Peninsula contain mercury. The lakes are not calcium carbonate or limestone buffered and typically have low alkalinity. That may also be due to acid rain. The higher concentrations of mercury found with low pH may be explained by the dissolved organic material characteristic of low pH lakes which may keep the mercury in suspension longer. Or the acidified lakes may enhance the environment for sulfur bacteria to methylate mercury. It's important to follow this up with more data. If the DNR starts using the clean techniques to measure mercury, it should at the same time take data on alkalinity and pH levels as well as fish tissue mercury levels and compare it with lake data collected in Minnesota and Wisconsin.

Dr. Premo stated that she didn't think there was enough support for the idea that mercury levels in fish have increased over time. The studies that show that are based on comparing walleye specimens in museums with current specimens. But because of their different sizes, the data may not be valid.

Mr. Sills indicated that the DNR report did say that levels in fish have been increasing but it should have been better qualified, since the data are only suggestions. Further, the conclusion was drawn more from Minnesota than Michigan data, since there is little available from Michigan.

Dr. Olsen responded that the Minnesota case could be much different than Michigan. Minnesota was drained 20-25 years ago, and the process could have possibly increased mercury in the lakes that collected the drainage.

Mr. Sills stated that most of the papers that they reviewed indicated that atmospheric sources may be the result of watershed disturbances, and that that possibility should not be disregarded.

Dr. Fischer asked why, if atmospheric mercury is the problem, Wisconsin, Michigan, Minnesota and New York State have mercury problems, yet Illinois, Indiana, and Pennsylvania claim that they do not have a problem.

Dr. Olsen suggested that the direction of the jet stream might be the problem. The winds from the midwest industrial areas seldom reach Pennsylvania.

Dr. Wolff disagreed. According to him, the pattern of sulfur emissions and pH distributions do not support this explanation. He further suggested that if coal burning is a major source, then Illinois, Ohio, Indiana and Pennsylvania should be hot spots.

Dr. Fischer stated that it appears that fish and sediment monitoring criteria have not been uniform across the region and that the discussion about state by state differences was speculative since there were no definite answers yet.

It was concluded that fish mercury data in the DNR report was based on poorly supported or missing data and that additional data were needed before any conclusions could be made.

Toxicity in Wildlife and Humans (Chapter 6)

Dr. Fischer described two kinds of studies done, monitoring wildlife in the wild and feeding studies. According to Dr. Fischer, Swain and Helwig's research is often quoted as showing a real problem with wildlife levels of mercury which may be responsible for declines of certain species in certain areas. Yet, careful review of the data and the conclusions, suggest that the data are really not very strong. Another example is a study of loons in Minnesota. In this study, 200 loons were collected. Most of the loons caught were trapped in fishermen's nets and died from unknown causes. Some of the loons were found to be emaciated. The emaciated loons were found to contain high tissue concentrations of mercury. However, it is not known whether the levels were high because the loons were emaciated or were sick because of high levels of mercury. Therefore, the statement that the emaciated loons were dying from mercury can not be supported. The studies on mink population may be similarly categorized.

Dr. Fischer concluded that it was his impression that available wildlife studies are not helpful in determining whether mercury is causing biological affects. On the other hand, the feeding studies in which ducks and other species were fed methyl mercury do show that mercury can interfere with reproduction and is toxic at .5 mg/kg in diets for mallard ducks. However, feeding studies, although informative, cannot always be extrapolated from the laboratory to the wild.

Dr. Cook stated that his impression is that the wildlife studies show that there is little difference between ambient levels and harmful effects, so there is currently not much margin of safety.

Dr. Fischer responded that that was a key question. Wildlife studies and observations of human toxicities resulting from accidental poisonings support the idea of a narrow margin of safety. The real key is how fast are mercury levels in the environment and in the human population increasing.

Dr. Demers was asked to comment on the human epidemiological studies. He said there was little objective data on low-dose exposures, quite a bit for high dose exposure and nothing in between. Also, there is nothing in the way of secular trends. The

Algonac-New Haven study was promising; however, a shortcoming with this study was that only mean blood levels were given. The study did not address hypersusceptible populations or pockets of fish eaters that may have consumed higher than average amounts.

Dr. Demers was asked whether there was any good evidence that exposure of human populations, including the fetus, to environmental mercury has adverse affects. He answered that in terms of massive exposure, yes. But, in terms of lower exposures, the studies are generally inconclusive. So far, there is no conclusive evidence that exposure to environmental mercury leads to lower birth weight or adverse impact on learning capabilities. Many of the studies on these issues have been plagued with problems of biased sampling, insufficient controls, unreliability in testing.

Mr. Sills asked whether the Panel had looked for adverse affects in Michigan and had not been able to find them.

Dr. Fischer indicated that while we have not looked for adverse effects in Michigan, data collected by Hal Humphries, MDPH, are good and do show that blood levels of mercury correlate with fish consumption. It is clear from that work and studies in other parts of the world that a major exposure to methyl mercury in humans is via fish. We should also be able to apply data on observed adverse affects to other places to Michigan.

Dr. Demers responded that there may be possible synergistic or antagonistic impacts interacting specifically in Michigan, particularly among children. He thought it would be appropriate for the Panel to suggest that such a study be undertaken.

Dr. Fischer said such studies should be done and in collaboration with other states because of the large numbers of people needed.

Ms. Joy Taylor, DNR, commented on the idea of recommending studies. Under the Clean Air Act, the EPA and the Financial Institute for Environmental Health Sciences do not have the funding necessary to meet deadlines established by Congress for various studies, including determination of the threshold level for mercury exposure and studies of aggregate emissions. Michigan might want to form a consortium with other states to help fund some of these studies. To the extent that there is federal funding set aside, Michigan's needs may coincide with the national interest.

Dr. Demers suggested that the Panel also look into funding from the Agency for Toxic Substances and Disease Registry (ATSDR), which may have funds for looking at water contamination, perhaps earmarked for the midwest. There might also be a chance to study synergism in hypersusceptible populations, such as kids in inner-city Detroit.

Mr. Humphrey discussed the inherent problems with sampling for mercury in fish. There are so many lakes and fish that it is an impossible job. MDPH is forced to use indicators, such as larger predator fish and they try to determine places where there may be a greater possible mercury exposure. On the other hand, the organics data

base on Great Lakes species has been growing, so they are now able to do regression analyses and are now being able to see trends over time. These data still represent indicators, however.

Dr. Fischer responded that the indicators need to be validated. The advisories give people an impression of exactness that is not justified.

Mr. Humphrey stated that there are two projects currently in the works. One is to do a statistically valid sample of a specific lake or lakes to address that question. The second is to study some Upper Peninsula lakes where mercury data are available for several years, that are known contaminated lakes, and the people who consume fish from those lakes to find the relationship between the levels reported in the lakes and the levels in the people. The DNR is also continuing measurements for the Algonac/South Haven study. All are tied up due to funding problems.

Dr. Olsen pointed out that it is important to know whether human levels are rising or falling, regardless of fish levels, which have been falling since the 1970s.

Mr. Humphrey said it is also important to do follow-up with the reproductive-aged females from the Algonac study.

Dr. Fischer indicated that MSU just received money to study the hair mercury levels of pregnant and non-pregnant fish-eating and non-fish-eating populations in Michigan.

Dr. Fischer observed that his initial impression had been that there would be more reliable data on mercury than there turns out to be. He asked that the Panel members inform Mr. Harrison what their information needs are at present, and to ask for experts if needed. He requested that between now and the next meeting that the Panel members get the information they need and begin to think about formulating a response to the Governor's questions.

Dr. van Ravenswaay commented that before the Panel proceeded with making recommendations, they need to know whether they are dealing with an issue of human health or an environmental problem. If the Panel decides that the levels found in fish are acceptable, there will be no reason to find out where all the mercury is coming from. If it is a health problem, the Panel will have to know the sources and fate, since those will impact on solutions. She recommended that these issues be resolved before a response is formulated.

Dr. Wolff indicated that even if there are no adverse effects found at current levels, they will still need all the information, because they still have to deal with the fish consumption advisories and the Clean Air Act, which legislates reduction of environmental mercury whether or not the Panel decides it is worth doing.

Dr. Bulkley said that the Great Lakes Water Quality Agreement calls for the elimination of the discharge of persistent toxic chemicals in the Great Lakes, so the data and

information, again, will not be wasted. An important contribution that the Panel could make would be to lay out steps needed to gather and interpret all the needed information.

Dr. van Ravenswaay spoke about the importance of the economic impacts of reducing mercury emissions and the importance of having accurate data to know the best way to do that. She indicated that she is very familiar with environmental economics literature and there appears to be nothing to approach the information she needs. Staff were requested to assist Dr. van Ravenswaay in terms of helping to obtain economic literature.

Two tentative dates (December 4, 1992 and December 14, 1992) were set as possible meeting dates for the Panel. The Executive Director was requested to finalize the date upon receipt of information regarding Dr. Fischer's schedule.

The meeting was adjourned at 5:00 p.m.

Keith G. Harrison, M.A., R.S., Cert. Ecol.
Executive Director